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EXAMINER	
ROSARIO, DENNIS	
ART UNIT	**PAPER NUMBER**
2624	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/879,529	SHIMIZU ET AL.	
	Examiner	Art Unit	
	Dennis Rosario	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment was received on 8/15/2006. Claims 1,5,6 and 9-33 are pending.

Claim Objections

2. Due to the amendment, the objection to claim 9 is withdrawn.

Claims 22 and 26 depend on canceled claim 7.

Claims 32 and 33 have the phrase "the output value" which do not have an antecedent basis.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 19 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 19, lines 3-5 that states:

"...said second image expansion means performs interpolation based on pixels constituting the original thin lines, not based on pixel obtained by anti-aliasing."

Which is interpreted as:

"...said second image expansion means performs interpolation based on pixels constituting the original thin lines **or (emphasis added)** not based on pixel obtained by anti-aliasing."

If the above interpretation is correct, then the "or" ought to be used instead of the comma after "lines," in claim 19 to make claim 19 clearly understood.

Regarding claim 19, lines 4,5, "...the original thin lines..." has no antecedent basis.

Response to Arguments

3. Applicant's arguments on page 12, lines 1,2 filed 8/15/2006 with respect to claims 5 and 15 have been fully considered but they are not persuasive and states:

"It follows that rank order processing is not equivalent to sorting."

The examiner respectfully disagrees since Miyake (US Patent 5,875,268)'s "sorting" in col. 16, line 60 and shown in fig. 33, num. 431 is equivalent to rank order processing as defined by the applicant on page 11 of the remarks:

"...the term 'rank order processing', as used by the Applicants, indicates a method of processing matrix data based in part on the positions of individual values of the matrix. It is noted that the term 'matrix' is used herein in the mathematical sense, e.g., a two-dimensional array of values." in page 11 of the remarks.

Based on the above definition a Broadest Reasonable Interpretation analysis can be applied (see MPEP 2111).

Regarding the term matrix, Miyake discloses a matrix as shown in fig. 40,num. 511 as a two-dimensional array of values, A-I. Thus, Miyake disclose the matrix as described by the applicants.

Regarding the term rank order processing, Miyake discloses a method of processing, via fig. 40,numerals 514 and 530, matrix data, fig. 40, num. 511, based in part on the positions ("corners" in col. 20, line 63 that have associated context of "Upper left corner, Upper right corner, Upper left corner, Lower right corner in col. 18, lines 15-19) of individual values (values such as 20,100,40 and 180 of said corners as shown in fig. 41A) of the matrix. Thus, Miyake teaches rank order processing in fig. 40.

Thus, based on the broadest reasonable interpretation as described above, Miyake does disclose rank order processing.

4. Applicant's arguments on page 12 have been fully considered but they are not persuasive and states:

> **"...the 'ranking' method disclosed in the preceding passage of Miyake is not based on the positions of pixels within a matrix."**

The examiner respectfully disagrees for the same reasons of paragraph 3 above. Note that the 'preceding passage' refers to another embodiment "<Second Modification of Fourth Embodiment>" in col. 16, line 56 that does not clearly show a position as clearly as the "<Second Modification of Fi9th Embodiment>" in col. 20, line 41 all of which paragraph 3 is based on.

5. Applicant's arguments on page 12 have been fully considered but they are not persuasive and states:

"In this 'ranking' method, only a subset of the pixels are processed by the sorting means. Thus fact precludes the use of algorithms based on a pixel's position within a matrix, as context information provided by other elements in the matrix is not guaranteed to be available to the sorting means."

The examiner respectfully disagrees for the same reasons of paragraph 3 above. Note that the subset as shown in fig. 40 as num. 511 are processed using position information or corner information, such as upper left corner, via fig. 40,num. 514 wherein A corresponds to said upper left corner of fig. 40,num. 511.

6. Applicant's arguments on pages 12,13 have been fully considered but they are not persuasive and states:

"This precludes the possibility that the position within the matrix is used by the 'ranking' method."

The examiner respectfully disagrees for the same reasons as paragraph 3, above.

7. Applicant's arguments on page 13 have been fully considered but they are not persuasive and states:

> **"Because the 'ranking' and sorting methods taught by Miyake are not dependent on position within a matrix, they cannot be equivalent to 'rank order processing' methods which take into account the position of a value within a matrix."**

The examiner respectfully disagrees for the same reasons as paragraph 3 above. Regarding 'dependent', Miyake teaches sorting as shown in fig. 40,num. 530 that requires or is dependent on position information such as the corner positions determined in fig. 40,num. 514.

8. Applicant's arguments on page 14 have been fully considered but they are not persuasive and states:

> **"...Miyake is devoid of any teaching...of determining an interpolation direction"**

The examiner respectfully disagrees since Miyake teaches interpolation as shown in fig. 4A that is "along a direction in one dimension in order to simplify the description." in col. 5, lines 60-62. Thus, the interpolation of fig. 4A corresponds to a dimension such as a horizontal or vertical dimension as shown in fig. 5B, label: 80 that is "interpolated...vertically and horizontally..." in col. 6, lines 13,14. Thus, fig. 4A describes the interpolation along a horizontal and vertical direction of fig. 5B, label: 80.

9. Applicant's arguments on page 15 have been fully considered but they are not persuasive and states:

> **"...this direction, as the term 'direction' is used by the Applicants, is in terms of the Cartesian or (x,y) plane on which the pixel data exists...Miyake does not demonstrate a direction of interpolation, nor does it demonstrate the determination thereof."**

The examiner respectfully disagrees since Miyake does demonstrate a direction as stated in paragraph 8,above, wherein said direction is in terms of an (x,y) or (i,j) plane shown in fig. 26, and does demonstrate the determination thereof since claim 1 is a method claim that does not limit the determination thereof to a specific device and is broadly interpreted as a person of ordinary skill in the art that decides to interpolate in said horizontal or vertical direction also see equation (1) in column 1 that is interpolation in terms of horizontal and vertical directions.

10. Applicant's arguments on page 16 have been fully considered but they are not persuasive and states:

"This suggests that the vertical axis of Figs. 10A and 10B represents the value of the pixels, as opposed to representing a direction oblique to the direction of interpolation."

The examiner respectfully disagrees since fig. 10A is a simplification of linear interpolation in order "to simplify the description" in col. 7, line 54. The examiner is not clear whether a horizontal axis is present in fig. 10A or 10B. Fig. 10A is a result of linear interpolation where the series of x's and circle's corresponds to the claimed direction of interpolation since "the x marks indicate interpolated values interpolated between the above-mentioned pixels [represented in fig. 10A as circles]." in col. 7, lines 51-53. Thus, fig. 10A clearly shows an interpolation direction in order to simplify the description such as fig. 3 that shows the result of interpolation in a plurality of directions such as from point A to E to I and a direction oblique to points A to E to I such as point C to point E to point G.

11. In response to applicant's argument on pages 16 and 17 that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., positions of pixels) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

12. Applicant's arguments on page 17 have been fully considered but they are not persuasive and states:

> **"Because determining the steepness of the edge is not based on direction, it cannot be equivalent to determining an interpolation direction."**

The examiner agrees with the applicant about the above statement with regard to the embodiment that fig. 9 is related to, but other embodiments does determine an interpolation direction as discussed in paragraphs 8-10, above.

13. Applicant's arguments on page 18 have been fully considered but they are not persuasive and states:

> **"Aoyama is devoid of any teaching...of a directional correlation reductions means."**

The examiner respectfully disagrees since Aoyma obtains a "smooth image" in col. 4, lines 55,56 just the same as the claimed correlation reduction that obtains a "smooth shape" in page 18, line 17 of the specification.

14. Applicant's arguments, see page 20, section Claim 9:, lines 7,8 with respect to 102(b) have been fully considered and are persuasive. The rejection of claims 9,18,19,27 and 31 has been withdrawn. However in view of further consideration there is a new grounds of rejection in view of Watanabe (US Patent 5,093,870).

15. Applicant's arguments on page 23 have been fully considered but they are not persuasive and states:

> **"...the cited passage contains no mention of determining whether the contrast in an image can be maintained at a predetermined level."**

Upon further review, the examiner agrees with the applicant that the cited passage does not state that the contrast in an image can be maintained at a predetermined level for the associated "First Embodiment" in col. 5, line 25. However in the "Fourth Embodiment" in col. 11, line 58, Miyake teaches that in fig. 19, label "4filt(k)-3th" corresponds to "h(k)" in col. 14, line 13 that has an "increased contrast" in col. 14, lines 13,14 that requires a "limitation" in col. 14, line 14 as indicated by the MIN and MAX values of fig. 19. Thus, the limitation using predetermined values of MAX and MIN corresponds to the claimed maintained at a predetermined level.

16. Applicant's arguments with respect to claim 19 have been considered but are moot in view of the new ground(s) of rejection since the argument of the respective parent claim was persuasive.

Claim Rejections - 35 USC § 102

17. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

18. Claims 1,5,15,20,21,24,25 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyake (US Patent 5,875,268 A).

Regarding claim 5, Miyake discloses an image transform method, for transforming original input image data into image data expanded by a ratio represented by a rational number or an integer, comprising the steps of:

a) forming an image by linearly expanding original image data in the vertical and horizontal directions (as indicated in fig. 44,num. 715 relative to fig. 44,num. 712); and

b) reducing the vertical and horizontal directional correlation (or “create a smooth edge” in col. 25, line 4) of said image through a rank order processing (fig. 44,num. 720 that uses information that is identified as a “central position” in col. 5, line 66 which are shown in fig. 44, num. 715 as F,G,J and K) to generate a final expanded image.

Regarding claim 15, Miyake discloses an image transform method, for transforming original input image data into image data expanded by a ratio represented by a rational number or an integer, comprising the steps of:

a) a vertical and horizontal directional linear interpolation unit for forming an image (Fig. 29,num. 101: LINEAR INTERPOLATING MEANS is a unit that forms an image labeled as LINEARLY INTERPOLATED INFORMATION.) by linearly expanding (Fig. 29,num. 101: LINEAR INTERPOLATING MEANS forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53.) original image data (Fig. 29,num. 101: LINEAR INTERPOLATING MEANS forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100 as an input terminal.) in the vertical and horizontal directions (Fig. 29,num. 101: LINEAR INTERPOLATING MEANS forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100,as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions.); and

b) a vertical and horizontal directional correlation reduction processing unit for reducing the vertical and horizontal directional correlation of said image (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or “create[s]...[a]...smooth edge” in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding “or increas[ing] by a factor” in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or “vertically” in col. 4, line 53 and horizontal or “horizontally” in col. 4, line 53 directions.) through a rank order processing (see paragraphs 3-7 above and Fig. 30, num. 416: DOT PLACING MEANS reduces the vertical and horizontal directional correlation or “create[s]...[a]...smooth edge” in col. 6, line 20 based on the output of fig. 29, num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding “or increas[ing] by a factor” in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or “vertically” in col. 4, line 53 and horizontal or “horizontally” in col. 4, line 53 directions through a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a “ranking” process mentioned in col. 17, line 16.)...

... to generate a final expanded image (Fig. 30, num. 416: DOT PLACING MEANS reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29, num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions through a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16 to generate a final expanded image represented in fig. 29, num. 107, where num. 107 is an output or final image based on expanded image or LINEARLY INTERPOLATED INFORMATION, hence final expanded image 107 of fig. 29.).

Regarding claim 1, Miyake et al. discloses an image transform method, for transforming original input image data into image data expanded by a ratio represented by a rational number or an integer, comprising the steps of:

a) reducing correlation in the vertical and horizontal directions of an image that is linearly expanded in the vertical and horizontal directions (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions.) to generate first expanded image data (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions to generate first expanded image data as shown in fig. 30,num. 419: EDGE INFORMATION.)...

... by a rank order processing (<u>see paragraphs 3-7 above and</u> Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions to generate first expanded image data as shown in fig. 30,num. 419: EDGE INFORMATION by a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16.) in a window having a predetermined size (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions to generate first expanded image data as shown in fig. 30,num. 419: EDGE INFORMATION by a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16 in a window of fig. 30,num. 413 having a predetermined size, 5 X 5.)...

... wherein a target pixel and its neighboring pixels (Fig. 30, num. 416: DOT PLACING MEANS is a unit that reduces the vertical and horizontal directional correlation or "create[s]...[a]...smooth edge" in col. 6, line 20 based on the output of fig. 29,num. 101: LINEAR INTERPOLATING MEANS which forms an image labeled as LINEARLY INTERPOLATED INFORMATION by linearly expanding "or increas[ing] by a factor" in col. 4, line 53 of original image data shown in fig. 29,num. 100, as an input terminal, in the vertical or "vertically" in col. 4, line 53 and horizontal or "horizontally" in col. 4, line 53 directions to generate first expanded image data as shown in fig. 30,num. 419: EDGE INFORMATION by a rank order processing as shown in fig. 30,num. 417: SORTING MEANS which contains a "ranking" process mentioned in col. 17, line 16 in a window of fig. 30,num. 413 having a predetermined size, 3 X 3, wherein a target pixel, E, and its neighboring pixels, A,B,C,D,F,G,H and I.) in the linearly expanded image data (Fig. 30, num. 413: LINEARLY INTERPOLATED INFORMATION) are included;

b) performing linear interpolation (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond o fig. 29, label: LINEARLY INTERPOLATED INFORMATION.), based on correlation (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3.)...

... with a target pixel constituting said original image data (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol.) and neighboring pixels (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIHBORING PIXELS)".) arranged in oblique directions (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIGHBORING PIXELS)" arranged in oblique directions as shown in fig. 9,num. 131, where pixel of interest M is arranged in an oblique direction with respect to pixel G,Q,S and I of the MAX (8 NEIGHBORING PIXELS).),...

... using said neighboring pixels to generate second expanded image data (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIGHBORING PIXELS)" arranged in oblique directions as shown in fig. 9,num. 131, where pixel of interest M is arranged in an oblique direction with respect to pixel G,Q,S and I of the MAX (8 NEIGHBORING PIXELS) where pixels G,Q,S and I are used to generate second expanded image data as shown by a line of X and O symbols in fig. 10A.) by determining an interpolation direction (see paragraphs 8-12 above and Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIGHBORING PIXELS)" arranged in oblique directions as shown in fig. 9,num. 131, where pixel of interest M is arranged in an oblique direction with respect to pixel G,Q,S and I of the MAX (8 NEIGHBORING PIXELS) where pixels G,Q,S and I are used to generate second expanded image data as shown by a line of X and O symbols in fig. 10A by determining an interpolation direction using fig. 9, num. 136: EDGE-ANGLE DISCRIMINATING MEANS.)...

... based on values of differences (Fig. 29, num. 105: MULTIPLIER performs linear interpolation as shown in fig. 10A where interpolated values as shown by "X" which correspond to fig. 29, label: LINEARLY INTERPOLATED INFORMATION based on "correlation" in col. 8, line 3 with a target pixel or PIXEL OF INTEREST as show in fig. 10A, central circle symbol, and neighboring pixels shown in fig. 10A as "MAX (8 NEIGHBORING PIXELS)" arranged in oblique directions as shown in fig. 9,num. 131, where pixel of interest M is arranged in an oblique direction with respect to pixel G,Q,S and I of the MAX (8 NEIGHBORING PIXELS) where pixels G,Q,S and I are used to generate second expanded image data as shown by a line of X and O symbols in fig. 10A by determining an interpolation direction using fig. 9, num. 136: EDGE-ANGLE DISCRIMINATING MEANS based on values of differences as shown in fig. 9,numerals 134 and 135.) between said target pixel and said neighboring pixels; and

c) employing (Fig. 29, num. 106 is an adder that is a form a employing.) said first expanded image data (Fig. 29, num. 106 is an adder that is a form a employing said first expanded image data shown in fig. 29, label: EDGE INFORMATION via num. 104.) and said second expanded image data (Fig. 29, num. 106 is an adder that is a form a employing said first expanded image data shown in fig. 29, label: EDGE INFORMATION via num. 104 and said second expanded image data as shown in fig. 29, label: LINERLY INTERPOLATED INFORMATION via num. 105.)...

... in an arithmetic combination (Fig. 29, num. 106 is an adder that is a form a employing said first expanded image data shown in fig. 29, label: EDGE INFORMATION via num. 104 and said second expanded image data as shown in fig. 29, label: LINERLY INTERPOLATED INFORMATION via num. 105 in an arithmetic combination using an adder 106 of fig. 29.) to generate a final image (Fig. 29, num. 106 is an adder that is a form a employing said first expanded image data shown in fig. 29, label: EDGE INFORMATION via num. 104 and said second expanded image data as shown in fig. 29, label: LINERLY INTERPOLATED INFORMATION via num. 105 in an arithmetic combination using an adder 106 of fig. 29 to generate a final image 107 of fig. 29.).

Note that Miyake states, "As many apparently widely different embodiments of the present invention can be made...(col. 26, lines 52-54)." Thus, various parts of the embodiments can be used interchangeably with other embodiments "without departing from the spirit and scope thereof (col. 26, lines 53,54)."

Regarding claim 20, Miyake discloses an article of manufacture comprising:

a) a computer usable medium having computer readable program code means ("algorithm" in col. 14, line 57) embedded therein for causing image transformation,

the computer readable program code means in said article of manufacture comprising:

b) computer readable program code means for causing a computer to effect the steps of claim 5.

Claims 21, 24, 25 and 29 are rejected the same as claim 20. Thus, argument similar to that presented above for claim 21 is equally applicable to claims 25 and 29.

19. Claims 9,18,19,23,27 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Watanabe (US Patent 5,093,870).

Regarding claim 9, Watanabe discloses an image transform method comprising:

a) an input step (fig. 2,num. S1) of entering original image data to be expanded by a magnification of two or more;

b) a first process step (fig. 2,num. S3) of reducing the step-shapes or chain-shapes (as shown in fig. 6A) of oblique lines appearing when said original image data are expanded by double or greater in size;

c) a second process step (fig. 2,num. S6) of:

c1) expanding, in the oblique direction (as indicated by connecting black dots in fig. 4), the structure of said original image, and

c2) reducing a bulging shape (as shown in figures 6B-6D relative to fig. 6A) appearing when a portion is expanded whereat vertical and horizontal lines of said original image data cross each other (or "intersect" in col. 4, line 32); and

d) an output step (fig. 2,num. S7) of outputting an image expanded by said magnification of two or more using said first and second process steps.

Regarding claim 27, Watanabe discloses a program storage device ("memory" in col. 1, line 16) readable by a machine (fig. 1,num. 15), tangibly embodying a program (a flowchart of fig. 2) of instructions executable by the machine to perform method steps for image transformation, said method steps comprising the steps of claim 9.

Claim 18 is rejected the same as claim 9. Thus, argument similar to that presented above for claim 9 of a method is equally applicable to claim 18 of a device.

Regarding claim 19, Watanabe teaches the image display device according to claim 18, wherein said original color image data includes thin lines (as shown in fig. 6B) obtained by anti-aliasing (or smoothing as shown in fig. 1,num. 12), and said second image expansion means (fig. 1,num. 14) performs interpolation (fig. 2,num. S6) based on pixels (or "dot character pattern" in col.4, lines 7,8) constituting the original thin lines, not based on pixels obtained by anti-aliasing.

Claims 23 and 31 is rejected the same as claim 27. Thus, argument similar to that presented above for claim 27 is equally applicable to claims 23 and 31.

20. Claims 10,11,12,13,14,16,17,22,26,28 and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Aoyama et al. (US Patent 6,535,651 B1).

Regarding claim 10, Aoyama et al. discloses an image processing apparatus comprising:

a) input means (Fig. 1, num. 10: STORAGE MEANS is an input means.) for entering original image data (Fig. 1, num. 10: STORAGE MEANS is an input means for entering original image data, "Sorg" as shown in fig. 1.) to be expanded (Fig. 1, num. 10: STORAGE MEANS is an input means for entering original image data, "Sorg" as shown in fig. 1 to be expanded or interpolated using fig. 1,num. 30: INTERPOLATING APPARATUS.);

b) vertical and horizontal directional interpolation means (Fig. 1, num. 46: SECOND OPERATION MEANS performs a "vertical direction or the horizontal direction" in col. 27, line 55 "interpolating" in col. 23, line 37 via "The first interpolating operation means 40" as shown in fig. 1.) for interpolating said
original image data (Fig. 1, num. 46: SECOND OPERATION MEANS performs a "vertical direction or the horizontal direction" in col. 27, line 55 "interpolating" in col. 23, line 37 via "The first interpolating operation means 40" as shown in fig. 1 for interpolating said original image data, Sorg.)...

... in the vertical and horizontal directions (Fig. 1, num. 46: SECOND OPERATION MEANS performs a "vertical direction or the horizontal direction" in col. 27, line 55 "interpolating" in col. 23, line 37 via "The first interpolating operation means 40" as shown in fig. 1 for interpolating said original image data, Sorg, in the vertical and horizontal directions as shown in fig. 5B, where in fig. 5B shows horizontal and vertical lines that corresponds to the claimed horizontal and vertical interpolation.);

c) vertical and horizontal directional correlation reduction means (<u>see paragraph 13 above</u> and Fig. 1, num. 46: SECOND OPERATION MEANS is a means for vertical and horizontal directional correlation reduction or "an interpolation point having a markedly different signal value does not occur on the image edge portion" in col. 30, lines 54-56 and in col. 34, lines 64-66; thus, "a step-like pattern is not enlarged at the oblique image edge portion" in col. 34, lines 66,67. Thus, according to the specification the claimed reduction performs "reducing the step-shapes or chain shapes of oblique lines" on page 14 of the specification which Aoyama et al. does using fig. 1,num. 46 which reduces or "a step-like pattern is not enlarged at the oblique image edge portion" in col. 34, lines 66,67.) for reducing correlation of the obtained image in the vertical and horizontal directions;

d) oblique direction detection means (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS.) for detecting an oblique direction (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS detects or specifies right and left oblique directions as mentioned in col. 27, line 10: "inclined upwardly to the right" and col. 27, line 14: "upwardly to the left".)...

...having a strong correlation (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS detects or specifies right and left oblique directions as mentioned in col. 27, line 10: "inclined upwardly to the right" and col. 27, line 14: "upwardly to the left" to determine a strong correlated direction or "specified [,which corresponds to the claimed strong correlated direction,] that the oblique image edge portion is inclined upwardly to the left".) with a target pixel and neighboring pixels (target pixel, Sij, and neighboring pixels, S(i+1)j, Si(J+1) and S(i+1)(j+1), as shown in fig. 2A) in said original image
data; and

e) directional interpolation means (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49.) for employing said neighboring pixels in said detected oblique direction to perform interpolation in said oblique direction (Fig. 1, num. 45: FIRST OPERATION MEANS performs interpolation as mentioned in col. 28, lines 47-49 for said target pixel "Sij" in col. 28, line 50 using said neighboring pixels "S(i+1), and (Si(j+1)" in col. 28, line 50 arranged as shown in fig. 2B in strong correlated direction or "specified [,which corresponds to the claimed strong correlated direction,] that the oblique image edge portion is inclined upwardly to the left [inclined upwardly to the right as shown in fig. 2B by the diagonal line between points Si(j+1) and S(i+1)j].").

Regarding claim 11, Aoyama et al. discloses the image processing apparatus according to claim 10, further comprising:

a) generation means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS) for generating expanded image data (Fig. 1,num. 60: IMAGE REPRODUCING MEANS generates expanded image data based on S' as shown in fig 1.) based on an image obtained by said vertical and horizontal directional correlation reduction means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS generates expanded image data based on S' as shown in fig 1 based on an image obtained by said vertical and horizontal directional correlation reduction means of fig. 1, num. 46: SECOND OPERATION MEANS.) and an image (S' as shown in fig 1 represents an image.) obtained by said oblique directional interpolation means (S' as shown in fig 1 represents an image obtained from fig. 1, num. 45: FIRST OPERATION MEANS.).

Regarding claim 12, Aoyama et al. discloses the image processing apparatus according to claim 11, further comprising:

a) input means for entering, as an adjustment value (Fig. 1,num. 51: SHARPNESS INSTRUCTION INPUT MEANS), the personal preference of a user concerning image quality (Fig. 1,num. 51: SHARPNESS INSTRUCTION INPUT MEANS allows a user to "adjust[ ]" in col. 35, line 11 the sharpness value; hence, "a visible image having good image quality can be reproduced" in col. 35, lines 12,13.),

b) wherein said generation means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS) employs said adjustment value (Fig. 1,num. 60: IMAGE REPRODUCING MEANS employs or receives the sharpness value.) to synthesize said image (Fig. 1,num. 60: IMAGE REPRODUCING MEANS employs or receives the sharpness value to synthesize or reproduce said image.)...

...obtained by said vertical and horizontal directional correlation reduction means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS employs or receives the sharpness value to synthesize or reproduce said image obtained by said vertical and horizontal directional correlation reduction means of fig. 1, num. 46: SECOND OPERATION MEANS.) with said image obtained by said oblique directional interpolation means (Fig. 1,num. 60: IMAGE REPRODUCING MEANS employs or receives the sharpness value to synthesize or reproduce said image, S' as shown in fig. 1, obtained by said vertical and horizontal directional correlation reduction means of fig. 1, num. 46: SECOND OPERATION MEANS with said image, S' as shown in fig. 1, obtained by said oblique directional interpolation means of fig. 1, num. 45: FIRST OPERATION MEANS which performs interpolation as mentioned in col. 28, lines 47-49.).

Regarding claim 13, Aoyama et al. discloses the image processing apparatus according to claim 10, wherein said vertical and horizontal directional correlation reduction means (Fig. 1, num. 46: SECOND OPERATION MEANS) performs the ranked median value selection (Fig. 1, num. 46: SECOND OPERATION MEANS performs an operation based on "selected sampling points" in col. 34, line 63.), for the target pixel and its neighboring pixels (Fig. 1, num. 46: SECOND OPERATION MEANS performs an operation based on "selected sampling points" in col. 34, line 63 for the target pixel and its neighboring pixel as shown in fig 5B and mentioned in col. 34, lines 58,59: "four sampling points".)...

... in the linearly expanded image data (Fig. 1, num. 46: SECOND OPERATION MEANS performs an operation based on “selected sampling points” in col. 34, line 63 for the target pixel and its neighboring pixel as shown in fig 5B and mentioned in col. 34, lines 58,59: “four sampling points” in the linearly expanded image data as shown in fig. 5A where the X’s represent linearly expanded image data and shown in fig. 5B labeled as Sm and Sn.), and thereby reduces the correlation of an image (Fig. 1, num. 46: SECOND OPERATION MEANS performs an operation based on “selected sampling points” in col. 34, line 63 for the target pixel and its neighboring pixel as shown in fig 5B and mentioned in col. 34, lines 58,59: “four sampling points” in the linearly expanded image data as shown in fig. 5A where the X’s represent linearly expanded image data and shown in fig. 5B labeled as Sm and Sn, and thereby reduces the correlation or “free from any step-like pattern” in abstract of an image.) in the vertical and horizontal direction.

Regarding claim 14, Aoyama et al. discloses the image processing apparatus according to claim 10, wherein said oblique direction detection means (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS.) employs differences (Fig. 1, num. 41:EDGE EXTENDING DIRECTION SPECIFYING MEANS employs “differences” in col. 25, line 31.) between said target pixel and said neighboring pixels to detect, with strong correlation, said oblique direction, and said oblique directional interpolation means performs linear interpolation in said oblique direction detected by said oblique direction detection means.

Claim 16 are rejected the same as claim 7. Thus, argument similar to that presented above for the method of claim 7 is equally applicable to that apparatus of claim 6.

Claim 17 are rejected the same as claim 8. Thus, argument similar to that presented above for claim 8 is equally applicable to claim 17.

Regarding claim 22, Aoyama et al. discloses an article of manufacture comprising:

a) a computer usable medium (Fig. 1,num. 45) having computer readable program code means ("algorithms" in col. 23, line 66) embedded therein for causing image transformation,

the computer readable program code means in said article of manufacture comprising:

b) computer readable program code means for causing a computer to effect the steps of claim 5.

Claims 26,28 and 30 are rejected the same as claim 22. Thus, argument similar to that presented above for claim 22 is equally applicable to claims 26,28 and 30.

Claim Rejections - 35 USC § 103

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

22. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake (US Patent 5,917,963 A) in view of Lee (US Patent 6,285,798 B1).

Regarding claim 6, Miyake teaches an image transform method, for transforming original input image data into image data expanded by a ratio represented by a rational number or an integer comprising the steps of:

a) forming an image by linearly expanding original image data in the vertical and horizontal directions (Fig. 5,num. 103: LINEAR INTERPOLATION PORTION expands an original image in the "vertical... and horizontal direction[s]" in col. 5, lines 58,59.); and

b) reducing (Fig. 5, num. 201: PIXEL VALUE DETERMINATION PORTION as mentioned in col. 9, lines 41,42 reduces by generating an "emphasized edge without jaggedness (col. 9, line 53).") the vertical and horizontal directional correlation of said image (Fig. 5, num. 201: PIXEL VALUE DETERMINATION PORTION as mentioned in col. 9, lines 41,42 reduces by generating an "emphasized edge without jaggedness (col. 9, line 53)." The vertical and horizontal directional correlation from the output of fig. 5,num. 103: LINEAR INTERPOLATION PORTION via num. 105.) through a rank order processing (Fig. 5, num. 201: PIXEL VALUE DETERMINATION PORTION as... ...mentioned in col. 9, lines 41,42 reduces by generating an "emphasized edge without jaggedness (col. 9, line 53)." The vertical and horizontal directional correlation from the output of fig. 5,num. 103: LINEAR INTERPOLATION PORTION via num. 105 and through a rank order processing as shown in fig. 5,num. 104: MEDIAN VALUE CALCULATION PORTION which arranges values from a MIN to MAX from fig. 5,num. 102 and selects the median or middle value.) to generate a final expanded image (Fig. 5, num. 201: PIXEL VALUE DETERMINATION PORTION as mentioned in col. 9, lines 41,42 reduces by generating an "emphasized edge without jaggedness (col. 9, line 53)." The vertical and horizontal directional correlation from the output of fig. 5,num. 103: LINEAR INTERPOLATION PORTION via num. 105 and through a rank order processing as shown in fig. 5,num. 104: MEDIAN VALUE CALCULATION PORTION which arranges values from a MIN to MAX from fig. 5,num. 102 and selects the median or middle value to generate a final expanded image 109 of fig. 5.)

c) determining, for said expanded image, whether the contrast in said original image data can be maintained (see paragraph 15 above and Fig. 1,num. 107: LUT determines for said expanded image of fig. 5,num. 109 whether the contrast or "sharpness" in col. 7, line 13 mentioned in the context of "contrast data" in col. 7, line 10 in said "original [image] data" in col. 7, line 15 outputted from fig. 5,num. 101: LINE BUFFER can be maintained or "controlled" in col. 7, line 14.) at a predetermined level (Fig. 1,num. 107: LUT determines for said expanded image of fig. 5,num. 109 whether the contrast or "sharpness" in col. 7, line 13 mentioned in the context of "contrast data" in col. 7, line 10 in said "original [image] data" in col. 7, line 15 outputted from fig. 5,num. 101: LINE BUFFER can be maintained or "controlled" in col. 7, line 14 at a predetermined level or "depending on a size of an edge associated with the original data" in col. 7, lines 14,15.); and

Miyake does not teach the additional limitations, but does suggest modifying fig. 5, num. 201 with a "high pass filter" in col. 9, line 55 for "edge emphasis" in col. 9, line 54.

Lee, uses a high pass filter (fig. 4,num. 60: FILTER) to emphasize an edge (fig. 4,num. 60: FILTER extracts "the high frequency details" in col. 11, line 50) as suggested by Miyake, comprising:

d) extracting a high frequency component (Fig. 4,num. 70: FILTER extracts "the high frequency details" in col. 11, line 50) from said expanded image (Fig. 4,num. 60: FILTER extracts "the high frequency details" in col. 11, line 50 from an image, D as shown in fig. 4.), when a contrast cannot be maintained (Fig. 4,num. 70: FILTER extracts "the high frequency details" in col. 11, line 50 from an image, D as shown in fig. 4 when a contrast cannot be maintained as determined in fig. 4,num. 90: CONTRAST GAIN-CONTROL (CGC) which maintains or "suppresse[s illumination edges] (col. 11, lines 56,57)".) at said predetermined level (Fig. 4,num. 70: FILTER extracts "the high frequency details" in col. 11, line 50 from an image, D as shown in fig. 4 when a contrast cannot be maintained as determined in fig. 4,num. 90: CONTRAST GAIN-CONTROL (CGC) which maintains or "suppresse[s illumination edges] (col. 11, lines 56,57)" where the illumination edges are suppressed at a predetermined level or "large gradient amplitudes" in col. 11, line 27.), and

b) adding said frequency component (Fig. 4,num. 70 contains a summation symbol that corresponds to the claimed adding said frequency component or high frequency details.) multiplied by a constant (Fig. 4,num. 70 contains a summation symbol that corresponds to the claimed adding said frequency component or high frequency details multiplied via num. 110a which corresponds to a factor "G_1" of fig. 4 and fig .2 shows a multiplication symbol.) to said expanded image (Fig. 4,num. 70 contains a summation symbol that corresponds to the claimed adding said frequency component or high frequency details multiplied via num. 110a, which corresponds to a factor "G_1" of fig. 4 and fig .2 shows a multiplication symbol, to said image D or D_1 of fig. 4.), or subtracting said frequency component multiplied by a constant from said expanded image.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Miyake's teaching of using an expanded image of fig. 5,num. 109 and high pass filter with Lee's teaching of contrast with filter that extract high frequency details of fig. 4, because Lee's teaching of fig. 4 suppresses "artifacts" in col. 11, line 8.

23. Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake (US Patent 5,875,268) in view of Taylor (US Patent 6,020,863).

Regarding claim 32, Miyake teaches the image transform method of claim 5, wherein the rank order processing includes:

a) raster-scanning a window (as shown in fig. 44, num. 711) enclosing a target pixel (F,G,J and K of said 711) and one or more of its neighboring pixels (any other letter of fig. 44, num. 711); and

b) computing the output value (upon the output of fig. 44,num. 717) of the target pixel by performing an averaging operation (fig. 44, num. 717) on the pixels enclosed within the window.

Miyake does not teach the claimed raster-scanning, but teaches that the invention can be "installed in an image output apparatus" in col. 22, lines 41,42, but does not show how the invention can be installed in such an apparatus.

Taylor teaches an output apparatus as shown in fig. 2,num. 200 that teaches that fig. 2,num. 108 performs "interpola-tion" in col. 4, lines 45,46 and the claimed raster-scanning (or "raster scan" in col. 5, line 14) a window (fig. 2,num. 154).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Miyake's teaching of installing the invention with an output apparatus that includes "buffers" in col. 22, line 42 with Taylor's fig. 2,num. 200, because Taylor's teaching of fig. 2,num. 108 includes an "most important" in relation to "display data interpola-tion" in col. 4, lines 45,46 in col. 4, line 52 feature that "controls the raster of pixel data from frame buffer **110**" in col. 4, lines 49,50 that is used for

displaying on a screen. Thus, Taylor provides a teaching that displays that is more important than interpolation, because without the teaching, the results of interpolation cannot be seen.

Claim 33 is rejected the same as claim 32. Thus, argument similar to that presented above for claim 33 is equally applicable to claim 32.

Conclusion

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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